

Farmer's Lung: Causes and Symptoms of Mold and Dust Induced Respiratory Illness

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Farmers account for more than 30 percent of adults disabled by respiratory illness. Yet, a large percentage of farmers are nonsmokers. If smoking is not to blame for these ailments, then what is? The answer is farmer's lung.

Farmer's lung is one of the more serious respiratory hazards to which farmers are exposed. Unfortunately, the number of farmers affected by farmer's lung has been increasing in recent years. This is likely the result of a growing awareness among farmers about their health and a subsequent increase in the frequency of doctor visits by farmers.

What Is Farmer's Lung?

Farmer's lung is a noninfectious allergic disease that is caused by inhaling **mold spores** in the dust from moldy hay, straw, or grain. This debilitating disease disrupts the normal function of the lungs, where oxygen enters and carbon dioxide exits the bloodstream. Many farmers are forced to leave the occupation due to the physical limitations caused by farmer's lung.

What Are Mold Spores and Why Are They so Dangerous?

Just as plants produce seeds for reproduction, molds produce tiny spores. These spores are less than 4 microns in size – so small that as many as 250,000 spores can fit on the head of a pin. On the farm, molds tend to grow in stored hay, grain, or silage when moisture content is high (30 percent) and storage areas are poorly ventilated.

You need to know about respiratory illnesses if you are engaged in the following tasks:

- working in dusty fields or buildings
- handling hay
- working in silos
- feeding or working with feedstuffs
- working in corn silage
- uncapping silos
- cleaning silos or grain bins
- working around animal feathers, hair, fur, or droppings
- working around fish meal
- applying agricultural chemicals (e.g., fertilizers and pesticides)
- working with toxic paints or solvents

Mold spores attach themselves to airborne dust particles when farmers move or work with hay, grain, or silage materials in which mold spores have grown. As a result, farmers inhale both dust particles and mold spores. In fact, a farmer can inhale up to 750,000 of these spores per minute.

The body has natural defense mechanisms (such as coughing and sneezing) that help prevent dust and other particles from entering the lungs. However, mold spores can often bypass these defenses because of their small size and overwhelming numbers.

Mold spores move into, accumulate, and settle into the lower lungs. Since most gas exchange takes place in

the lower lungs, toxins produced by the spores travel through the bloodstream with the oxygen. The body's reaction to the toxins causes permanent scarring of the lung tissue, which affects the lungs' ability to transfer oxygen into the bloodstream. Each exposure to mold spores increases the damage. The body's last defense against these spores is to develop an allergic reaction that causes cold- or pneumonia-like symptoms.

Symptoms of Farmer's Lung and State of Illness

Farmers will develop specific symptoms of farmer's lung based on the amount of dust and spores to which they have been exposed or the intensity of their body's reaction to the dust and spores. Farmers are also likely to develop an increased sensitivity to mold exposure over time and will have more severe reactions with lighter exposures. In all cases, each additional exposure will aggravate the problem.

The symptoms of farmer's lung may be most severe for a 12 to 48 hour period after exposure to mold spores. However, the symptoms may remain for as long as two weeks. Acute farmer's lung is the short-term form of the disease. Farmers typically develop chronic farmer's lung due to repeated exposure to mold spores over time, usually because they continue to ignore the symptoms of acute farmer's lung. However, it is possible to develop chronic farmer's lung even after one acute attack.

Delaying medical treatment for farmer's lung often worsens the situation. Permanent damage has often occurred by the time a farmer sees a doctor. In some cases scar tissue (pulmonary fibrosis) has already developed, which further interferes with normal lung function.

How to Tell if You have Farmer's Lung

Do not self-diagnose. Always check with your doctor if you suspect you have farmer's lung. Contact your doctor immediately, if you have any of the following symptoms:

- sudden illness that develops a few hours after you handled moldy crop material
- chronic cough
- general feeling of tiredness or depression

Medical Treatment

Your doctor may not be familiar with farmer's lung and may mistake your symptoms for a cold, asthma, flu, or even pneumonia. Therefore, you must work with your doctor so he can make a correct diagnosis. Make sure to tell your doctor that you are a farmer and whether you have been exposed to moldy crop material. Also, be sure to inform him of the types of chemicals and/or dusts to which you are exposed.

Acute State	Subacute State	Chronic State
<p>This condition usually begins four to eight hours after exposure to mold spores. Most farmers ignore the symptoms because they are so similar to those of the common cold.</p>	<p>This condition is more serious because the symptoms will be more severe and will last longer even with no further exposure to mold spores.</p>	<p>This condition is the most serious because of its gradual onset and its long-lasting debilitation. In the chronic state, the disease becomes irreversible.</p>
Typical Symptoms:	Typical Symptoms:	Typical Symptoms:
<ul style="list-style-type: none"> • severe shortness of breath with any exertion • headache • irritating cough 	<ul style="list-style-type: none"> • progressively increasing severe shortness of breath with any exertion • chronic coughing • physical weakness • occasional fever and sweating at night • appetite depression • general aches and pains 	<ul style="list-style-type: none"> • progressively increasing severe shortness of breath with any exertion • chronic coughing • physical weakness • occasional fever and sweating at night • appetite depression • general aches and pains

During your visit, the doctor may do one or more of the following to confirm or disprove a diagnosis:

- take a blood test
- take a chest x-ray
- administer a breathing capacity test
- administer an inhalation challenge
- examine lung tissue
- perform an immunological investigation
- perform a lung function test
- review your clinical history

Farmer's lung *can be controlled* in many ways. For example, your doctor may write a prescription for medication that relieves the symptoms of farmer's lung. Unfortunately, farmer's lung **cannot** be cured.

How to Prevent or Control Farmer's Lung

Farmers can control or even minimize the possibility of getting farmer's lung by complying to the following preventative measures:

- identify contaminants in the work environment
- minimize the amount and type of contaminants in the work environment
- avoid exposure to contaminants and mold spores and dust from decayed grains and forages
- limit exposure to all contaminants
- operate within a controlled environment whenever possible (e.g., cab, control room, etc.)
- use mechanical controls to remove air contaminants (e.g., fans, exhaust blowers, filters etc.)
- maximize ventilation in dusty areas
- move work outside whenever possible
- avoid dusty work in confined areas
- wear respirators, masks, or other protective equipment

If you decide to use some form of respiratory protection, make sure to select the appropriate device for the task. For example, most farmers wear dust masks to protect themselves from farmer's lung. However, these will not work if you are exposed to extremely high levels of mold spores or you already have developed farmer's lung.

If you have farmer's lung, talk to your doctor about the type of equipment that will offer the most protection because every exposure increases the risk of serious permanent lung damage. Furthermore, make sure the personal protection equipment fits well and is properly maintained. For more information about respiratory equipment, see your local Extension office or *Respiratory Protection in Agriculture*, Virginia Cooperative Extension publication 442-601.

Management to Prevent Mold Spore Growth

- use mold inhibitors
- bale hay, ensile crops, and harvest and store grain at recommended moisture contents
- dry grain properly before storage
- properly ventilate storage buildings
- adequately ventilate crops to cool them down
- always use a plastic sheet to cap open silos (not plant material) holding down the edges with heavy weights (e.g., tires)

When You Must Work with Moldy Material

- wet down feed before transferring it to minimize dust
- convert to mechanical or automated feeding or feed-handling systems
- wet down the top of the silo before uncapping ensiled material
- use some wetting techniques when cleaning out grain bins or other dusty areas
- use respiratory protection when handling moldy or dusty materials.

More Information about Farmer's Lung

The chances of acquiring farmer's lung are greatest in late winter and early spring. This is mainly because farmers feed hay and grain materials, which are likely to contain mold spores. Farmers also tend to feed baled hay inside during the colder months. This increases the likelihood of inhaling mold spores because they are more concentrated in a confined space such as a barn.

Mold spore inhalation may be a problem when you are cleaning out grain bins or opening new silos. Mold spores may be released from the top layer of silage.

Additional Reading Material

Grisso, R.D., S. Gay, G. Hetzel, and B. Stone. 2004. *Respiratory Protection in Agriculture*. Virginia Cooperative Extension publication 442-601, Virginia Tech, Blacksburg, Va.

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